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Technology and innovation in speech therapy: health hackathon as a health education strategy

Tecnologia e inovação na fonoaudiologia: *hackathon* da saúde como estratégia de educação em saúde

Tecnología e innovación en logopedia: el hackathon sanitario como estrategia de educación para la salud

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Abstract

Introduction: Data from the World Health Organization indicate a growing risk of hearing loss among adolescents, underscoring the need for preventive educational initiatives. In this context, projects that integrate digital technologies and participatory methodologies—such as hackathons—emerge as promising strategies to engage youth and promote practices for hearing, health preservation and enhanced communication. **Objective:** To report the organizational experience of the Health, Technology, and Communication Hackathon, with emphasis on the collaborative processes adopted, challenges faced, and outcomes achieved in fostering health innovations.**Method:** This is a qualitative, documentary-

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type experience report conducted in a virtual environment over three consecutive days. Undergraduate students in Speech-Language Pathology and Design participated in interdisciplinary teams and received training and mentoring aimed at developing instructional technological solutions related to hearing health and communication. **Results:** The Hackathon involved 18 participants divided into four teams, which developed games, quizzes, and educational videos using tools such as Scratch Jr. and open-source video editing applications. The projects addressed themes including hearing loss prevention, assertive communication, and strategies to overcome communication difficulties. The online event was successfully carried out, promoting immersion, interdisciplinary collaboration, and student protagonism. Active participation and positive feedback from attendees demonstrated strong engagement and the potential replicability of the adopted methodology. **Conclusion:** The Health, Technology, and Communication Hackathon demonstrated the feasibility and effectiveness of conducting immersive online events focused on health education. The initiative highlighted the value of interactive and interdisciplinary methods in training health students.

Keywords: Communication; Health Education; Health ICT; Speech, Language and Hearing Sciences; Diffusion of Innovation

Resumo

Introdução: Dados da Organização Mundial da Saúde apontam o aumento dos riscos de perda auditiva entre adolescentes, reforçando a necessidade de ações educativas preventivas. Nesse cenário, projetos que integram tecnologias digitais e metodologias ativas, como os *hackathons*, mostram-se estratégias promissoras para fomentar o engajamento de jovens e promover práticas de prevenção em saúde auditiva e aprimoramento da comunicação. **Objetivo:** Relatar a experiência de organização do *Hackathon* da Saúde, Tecnologia e Comunicação, com ênfase nos processos colaborativos adotados, nos desafios enfrentados e nos resultados obtidos para a promoção de inovações em saúde. Método: Estudo qualitativo, do tipo relato de experiência, com caráter documental, realizado em ambiente virtual durante três dias consecutivos. Participaram graduandos de Fonoaudiologia e *Design*, organizados em equipes interdisciplinares, que receberam oficinas e mentorias para o desenvolvimento de soluções tecnológicas instrucionais voltadas à saúde auditiva e comunicação. **Resultados:** O *Hackathon* contou com 18 participantes distribuídos em quatro equipes, que desenvolveram jogos, *quizzes* e vídeos educativos utilizando ferramentas como o "*Scratch Jr."* e aplicativos de edição de vídeo *open source*. Os projetos abordaram temas como prevenção da perda auditiva, comunicação assertiva e estratégias para superação de dificuldades comunicativas. A realização do evento remoto foi bem-sucedida, favorecendo a imersão, a cooperação entre diferentes áreas e o protagonismo estudantil. **Conclusão:** O *Hackathon* da Saúde, Tecnologia e Comunicação demonstrou a viabilidade e eficácia da realização de eventos imersivos remotos voltados à educação em saúde, evidenciando o valor das metodologias interativas e interdisciplinares na formação de estudantes da área da saúde.

Palavras-chave: Comunicação; Educação em Saúde; TIC em Saúde; Fonoaudiologia; Difusão de Inovações

Resumen

Introducción: Datos de la Organización Mundial de la Salud indican un aumento del riesgo de pérdida auditiva entre adolescentes, lo que refuerza la necesidad de implementar acciones educativas preventivas. En este contexto, los proyectos que integran tecnologías digitales y metodologías participativas, como los hackatones, se presentan como estrategias prometedoras para fomentar el compromiso juvenil y promover prácticas de prevención en salud auditiva y mejora de la comunicación. **Objetivo:** Relatar la experiencia de organización del Hackathon de Salud, Tecnología y Comunicación, con énfasis en los procesos colaborativos adoptados, los desafíos enfrentados y los resultados obtenidos en la promoción de innovaciones en salud. **Método:** Estudio cualitativo, del tipo relato de experiencia, con carácter documental, realizado en un entorno virtual durante tres días consecutivos. Participaron estudiantes de pregrado en Fonoaudiología y Diseño, organizados en equipos interdisciplinarios que recibieron talleres

y mentorías para el desarrollo de soluciones tecnológicas educativas enfocadas en la salud auditiva y la comunicación.**Resultados:** El Hackathon contó con 18 participantes divididos en cuatro equipos, los cuales desarrollaron juegos, cuestionarios y videos educativos utilizando herramientas como Scratch Jr. y aplicaciones de edición de video de código abierto. Los proyectos abordaron temas como la prevención de la pérdida auditiva, la comunicación asertiva y estrategias para superar dificultades comunicativas. El evento virtual fue exitoso, favoreciendo la inmersión, la colaboración interdisciplinaria y el protagonismo estudiantil. La participación activa y la retroalimentación positiva de los participantes demostraron un alto nivel de compromiso y el potencial de replicabilidad de la metodología empleada. **Conclusión:** El Hackathon de Salud, Tecnología y Comunicación demostró la viabilidad y eficacia de realizar eventos inmersivos en línea enfocados en la educación para la salud.

Palabras clave: Comunicación; Educación en Salud; TIC en Salud; Fonoaudiología; Difusión de Innovaciones

Introduction

Health education projects targeting youth primarily aim to foster behavioral changes that enhance the population's quality of life[1]. For these initiatives to be effective, it is essential that the strategies adopted align with the target audience's profile, promoting engagement, empowerment, and ownership of the knowledge related to the topics addressed. In this context, the use of information and communication technologies proves particularly effective in motivating adolescents and young adults, encouraging active participation in the educational process. Moreover, the values conveyed and experienced during these actions can play a transformative role, especially for young individuals from socially vulnerable groups. In such cases, where marginalization compromises opportunities for education and inclusion, schools can become essential spaces for personal and social development, significantly contributing to the promotion of preventive health behaviors[2].

The term "Hackathon" results from the combination of two English words: "hack," referring to creative and efficient programming, and "marathon," indicating an extended event[3]. The first documented use of the term occurred in 1999 during two distinct events. The first was promoted by OpenBSD[4], starting on June 4, when ten developers gathered at a residence in Calgary, Canada. Shortly after, a second event was held by Sun Microsystems[5]. Although these events marked the concept's origin, hackathons gained popularity as competitions for project development and talent identification in programming with the support of major technology companies like Yahoo and Facebook[6]. In the health field, this format was later adopted, notably with the MIT Hacking Medicine initiative in 2011, considered a pioneer in the area[7].

A hackathon is a collaborative event characterized by intensive immersion, lasting several days, bringing together participants from various professional fields to develop solutions for specific challenges. Initially, such events were exclusively focused on programming and computing[7,8]. However, over time, the format has been adapted to encompass a broader thematic and interdisciplinary diversity, facilitating integration across different knowledge areas and expanding its innovative potential. This scope expansion has enabled hackathons to be applied in contexts such as health, education, and communication, contributing to the enhancement of projects and the creation of more comprehensive and socially relevant solutions.

Health-focused hackathons have addressed various relevant subjects, including stroke[9], dengue[10], sexual health[11], and public health[12,13], among others. These initiatives are based on the principle of co-creation, promoting collaboration among participants from diverse backgrounds—such as health, engineering, business, and design—who work in interdisciplinary teams to develop innovative solutions within a set timeframe[7]. This dynamic fosters the integration of knowledge and encourages the joint construction of proposals applicable to real-world health sector's challenges.

Aligned with the interaction between technology and health, the field of Telehealth has gained prominence through research groups developing projects aimed at Health Education, emphasizing themes like Auditory Health and Communication. In Brazil, Speech-Language Pathology has

followed this trend, implementing innovative initiatives that incorporate technological resources and interactive methodologies, in line with new guidelines and objectives of health care[14,15]. This integration of technology, education, and health care represents a significant advancement in promoting access to qualified information and strengthening preventive and interventional actions, particularly in vulnerable contexts.

In 2015, the World Health Organization (WHO) warned about the increasing cases of hearing loss among adolescents and young adults, estimating that 1.1 billion individuals in this age group were at risk of developing hearing loss due to prolonged exposure to harmful sound levels, especially in leisure environments[16]. This concerning scenario was reaffirmed in the first World Report on Hearing, published by the WHO in 2021, projecting that by 2050, one in four people worldwide—approximately 2.5 billion individuals—will experience some degree of hearing loss[17]. These data underscore the urgency of intensifying preventive actions and care strategies focused on auditory health, with special attention to vulnerable populations and the promotion of awareness from a young age.

Considering this, the present study aimed to report the experience of organizing the Health, Technology, and Communication Hackathon, emphasizing the collaborative processes adopted, the challenges faced, and the results obtained in promoting health innovations.

Materials and methods

Study Design

This study is a qualitative, documentary experience report on the development of the Health, Technology, and Communication Hackathon, part of a broader project aimed at developing social entrepreneurship actions focused on health promotion in schools, emphasizing the training of young leaders through sustainable multiplier actions.

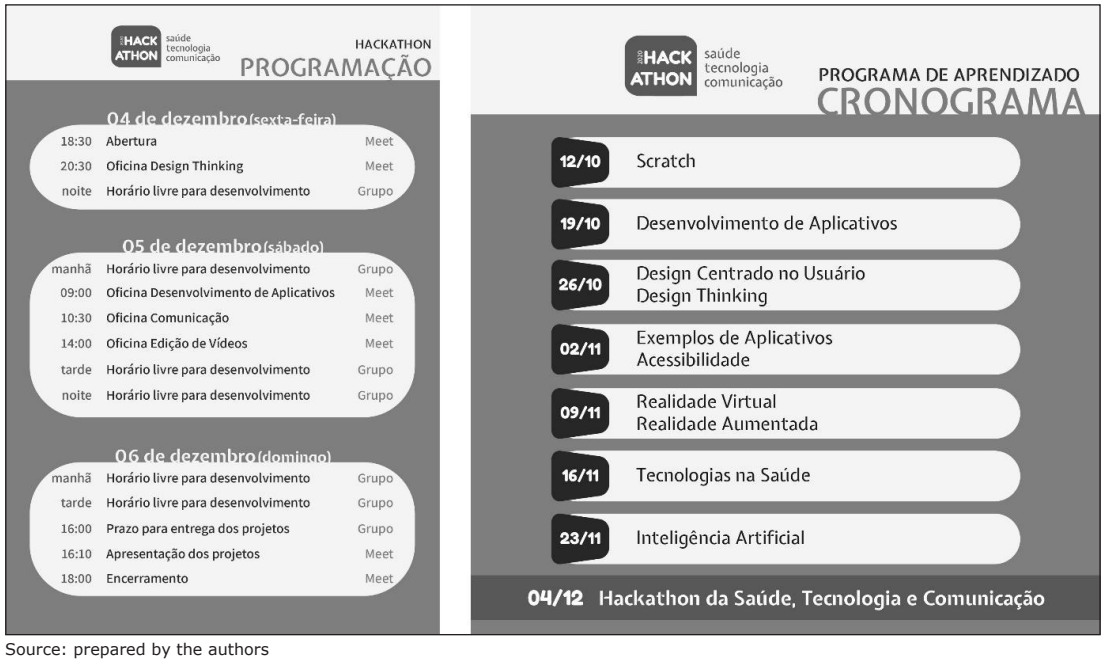
With the premise of being a "youth-for-youth" project, the event was structured in stages, the first being the execution of the Health, Technology, and Communication Hackathon, during which the project team, composed of undergraduate and graduate students were trained. This activity covered topics such as design, gaming, video production, and communication, delivered by professors and professionals from the respective fields, providing participants with greater knowledge and learning about the processes involved in creating instructional technological materials, so that in subsequent stages, this knowledge could be disseminated to high school students from public schools in the participating municipality.

The Hackathon's construction was based on the organizing team's previous experience in similar remotely conducted events focused on health topics. The event took place on December 4, 5, and 6, 2020, starting on Friday (12/04/2020) at 6:30 PM and ending on Sunday (12/06/2020) at 6:00 PM. Platforms used included "Discord", "Google Meet", and "WhatsApp". The Hackathon proposed an immersive weekend with a schedule alternating between synchronous workshops led by professionals and periods dedicated to participants developing materials aimed at innovative solutions for the themes of auditory health and communication.

To implement the proposal, a visual identity (Figure 1) was developed and used across all event materials, such as video layouts, questionnaires, schedule designs (Figure 2), promotional materials, manuals, and certificates.

Source: prepared by the authors

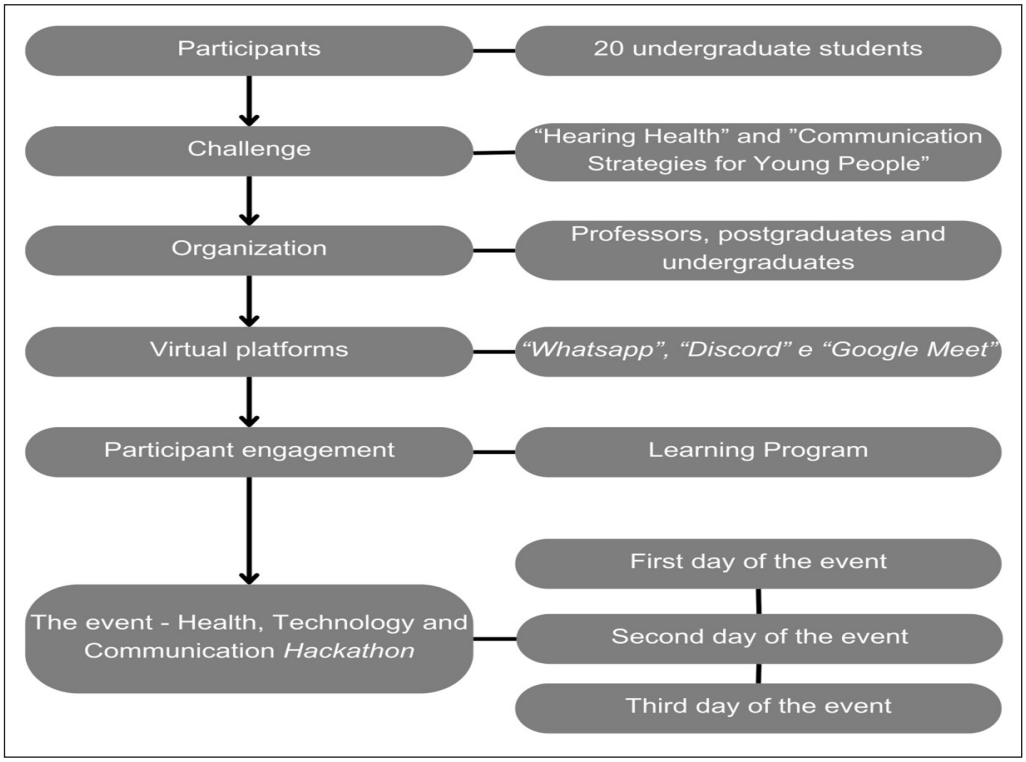
Figure 1. Visual identity of the event



Source: prepared by the authors

Figure 2. Event schedule for promotional purposes.

For better visualization of the process, the stages were described in a flowchart presented in Figure 3.



Source: prepared by the authors

Figure 3. Flowchart of the event development stages.

Organization

The event was organized by undergraduate students from the Speech-Language Pathology course at the Bauru School of Dentistry (FOB-USP) and the Design course at the Integrated Colleges of Bauru (FIB). The organizing team comprised professors, undergraduate, and graduate students from the respective courses. To coordinate and align activities, five remote meetings were held via the "Google Meet" platform.

Participant Engagement

Initially, the educational strategy of the Health, Technology, and Communication Hackathon project was implemented. Starting October 12, 2020, content related to the event's themes was made available weekly on the Discord platform. The goal was to introduce new topics to participants, promoting motivation and engagement. The content, previously prepared by the research team, covered subjects such as "*ScratchJr.*", app development, user-centered design, design thinking, app examples, accessibility, virtual reality, augmented reality, health technologies, and artificial intelligence.

Online Platforms

The Health, Technology, and Communication Hackathon was conducted entirely in a virtual environment using digital platforms that facilitated both the development of stages and communication among participants. A "WhatsApp" group was created to ease general communication.

To develop the stages and integrate teams, the "Discord" platform was used, where strategies were created to organize content related to the event, including announcements and communication

rooms for participants. Two PDF tutorials were developed to assist participants in creating accounts and navigating the platform.

Meetings were mediated through "Google Meet", with a single access link used for all synchronous event activities: opening, workshops, final project presentations, and closing.

Program

At the event's opening, participants were introduced to the proposed challenge and divided into four teams: two focused on the theme "Youth Auditory Health" and two on "Communication." To encourage interaction, each team was invited to create a name and a chant, which were to be recorded and submitted via the "Discord" platform.

The scientific program included workshops on the platforms and content to be used in the challenges. Lectures were also delivered on topics such as "Design Thinking," "Scratch Jr.," "Communication and Entrepreneurship in Health," and "Developing Videos Using Open Source Applications." Each day, teams had dedicated time slots for collaborative work to address the challenge.

On the final day of activities, teams presented their names, chants, and developed projects.

Mentorship

To support activity development, the organizing team collaborated with four undergraduate Design students, referred to as "angels." These mentors provided continuous assistance during the event, helping participants define strategies, utilize technological materials, and plan projects.

Challenge

The challenge presented at the event's opening tasked teams with developing an innovative solution to a problem related to auditory health or communication. Teams were required to create three products: an activity or game using the "*ScratchJr.*" app, and two three-minute videos—one pitch describing the activity development process and a demonstration of the activity's functionality. To submit their products, groups had to upload the videos to a "YouTube" channel, set them as unlisted, and send the links via "Discord" at least two hours before the event concluded.

Results

The Hackathon

The students were divided into four teams, which chose the topics to be addressed: "Youth Auditory Health" and "Communication." Each team assigned a name and created a chant, which was recorded and shared via the Discord platform. The teams had autonomy to organize themselves based on the availability of their members, with the goal of optimizing task execution and participation in the workshops. Table 1 below illustrates the event days and their respective activities.

Table 1. Organization chart of the event's activities - schedule and people responsible

Event Day	Activity	Responsible
Day 1	Opening and orientation on programming and use of "Discord"	Organizing team
	Free time to organize and start work	Participants
	Design Thinking workshop	Organizing team / Guest
	Free time for teamwork	Participants
Day 2	"ScratchJr" workshop	Design teachers and professionals
	Workshop "Communication and entrepreneurship in health"	Teachers from the Speech and Hearing Therapy course
	ree time to carry out the tasks	Participants
	Workshop "Video development using open source applications"	Design student and Youtuber
	Group activities	Participants
Day 3	Closing and group presentations	Organizing team and coordination
	Presentations by the groups: "ComunicaÊ", "Comunica Jovem!", "Os Estagiários", "AudiJovem"	Participating groups

Source: prepared by the authors

Participants

Participation in the event was free of charge. With the aim of promoting interdisciplinarity and integration between different areas of knowledge in the search for solutions to challenges related to improving the population's quality of life, the event involved 18 individuals. For the practical activities, students were organized into four teams, previously defined by the organizing committee.

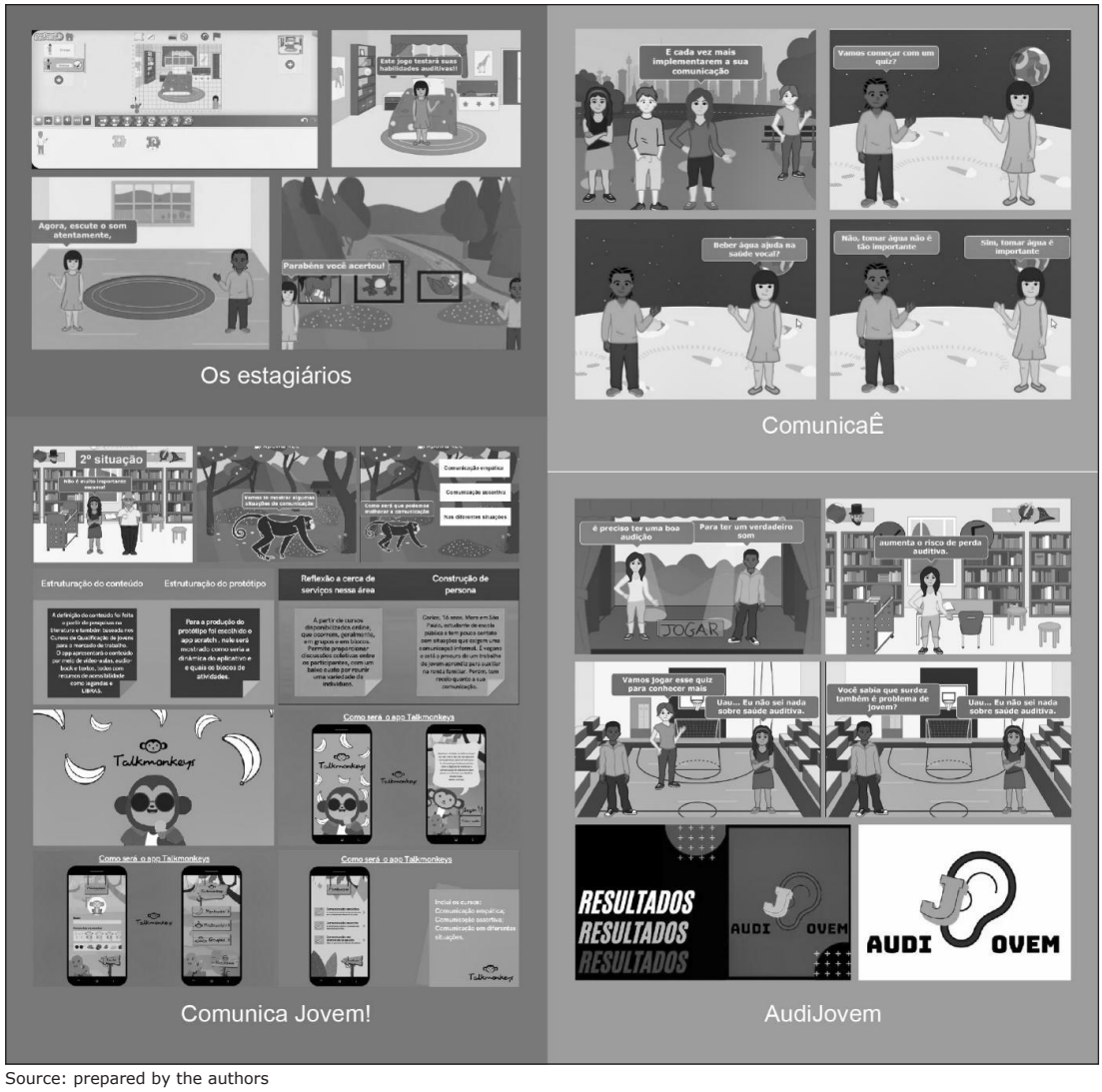
Projects

All teams developed the proposed materials (*Insert Figure 4 here*). The group "Os Estagiários" created a game designed to test the user's auditory skills. During the activity, the player simultaneously listened to the sound of rain and an animal sound and had to identify, from three options, which animal was being represented.

To assist young people in stressful communication situations, the group "ComunicaÊ" developed a quiz composed of tips to improve communication among children and youth. The activity included questions with two answer options—one correct and one incorrect. Topics included: "Does drinking water help vocal health?", "What is a voice disorder?", and "Does the voice change throughout life?". In addition to the questions, the quiz featured positive reinforcement strategies, praise, and suggestions for enhancing oral expression.

The group "Comunica Jovem!" presented the idea for an app offering strategies to improve communication and help young people overcome communicative difficulties, focusing on assertive and empathetic communication. The activity involved practical, everyday communicative situations.

To address youth auditory health, emphasizing key information on hearing loss prevention and encouraging peer-led educational roles, the group "AudiJovem" developed a quiz featuring myths and facts about hearing health, including interesting facts and guidance on how to maintain healthy hearing.



Source: prepared by the authors

Figure 4. Materials developed by the teams.

Discussion

Speech-Language Pathology has been developing innovative projects by integrating technological resources into the health field, aimed at community-focused proposals. A notable example is the "*Jovem Doutor Bauru Project"*, which is part of the broader "*Jovem Doutor Redes Project"*, coordinated by the Telemedicine Discipline of the Department of Pathology of the University of São Paulo's School of Medicine.

The program's aim is to "encourage high school and university students to develop cooperative projects that promote health and contribute to the quality of life of communities in vulnerable situations through sustained action."[18,19] Furthermore, by applying theoretical knowledge in practice, the project offers digital inclusion and the opportunity to exercise citizenship, addressing topics related to primary health care through university outreach, under the guidance of professors, promoting university-community interaction[20].

The training of high school students is carried out through educational materials such as videos, the *Virtual Man Project*, and educational platforms. Selected university students act as tutors to

these youth and monitor the activities developed. Through *Interactive Tele-education*, knowledge is reinforced, doubts clarified, and activities evaluated[21].

The field of Speech-Language Pathology has actively participated in the project through various themes. Specifically, the topics of youth hearing health and communication have stood out, encompassing prevention, diagnosis, and rehabilitation of communication disorders[22,23,24]. It is worth emphasizing that these initiatives align with the data presented in the *World Report on Hearing* by the World Health Organization, which states that by 2050, the number of people with disabling hearing loss may increase from 430 million to nearly 700 million. Hearing loss can impair language, cognitive and communication development, consequently affecting social interactions[17,25].

In this context, the *Health, Technology, and Communication Hackathon* stood out for its experiential learning approach, involving professors, undergraduate and graduate students in a common goal—aligning technology and health in the prevention and care of auditory and communication health.

With its focus on health innovation, this initiative demonstrated the feasibility of conducting a fully remote immersive event with young participants, and the effectiveness of interdisciplinarity in generating ideas to address related challenges.

The fields of Design and Speech-Language Pathology were present from the initial concept through to the final implementation of the project. The full involvement of design students was essential at all stages, mainly contributing in two areas: event organization and the creation of functional, engaging, and motivating materials for participants.

The *Design Thinking* approach to identifying and solving problems enabled teams to meet the challenge and develop a final product, guiding them toward the best possible outcomes.

This experience report demonstrated the feasibility and effectiveness of conducting a fully remote hackathon focused on youth hearing health and communication strategies through multidisciplinary integration between health, design, and technology fields.

Although the hackathon format is not new, virtual implementations are still less common than n-person formats. However, since the onset of the COVID-19 pandemic, there appears to have been an increase in the number of virtual hackathons[26].

The *Health, Technology, and Communication Hackathon* had some distinguishing characteristics, such as the participation of undergraduate students rather than professionals and the absence of a competition element—there were no awards for the best projects, as the focus was task execution. Therefore, the entire organization process was structured around motivational strategies based on three main elements: visual identity, a learning program, and digital platforms.

The creation of a visual identity and its application in promotional and learning materials aimed to enhance participants' identification with the event and immersion in the content.

As part of an educational strategy, the team remained in weekly contact with participants, presenting new content distinct from that typically covered in their academic programs.

Given that the event was entirely remote, digital platforms were selected to ensure accessibility via smartphones or computers. "WhatsApp" and "Google Meet" were chosen for their widespread use among students, particularly during the COVID-19 pandemic when classes were held remotely. Some participants were already familiar with "Discord" and used it for academic or leisure purposes.

When considering health education from a broad and transformative perspective, it is essential to recognize the efforts of representative bodies in Brazilian Speech-Language Pathology in shaping the direction of education in the field. Noteworthy in this regard are the contributions of the Education Committee of the Brazilian Society of Speech-Language Pathology and Audiology, which over the past decades has promoted discussions and events aimed at the critical, ethical, and socially committed training of speech-language pathologists. These efforts have encouraged the development of new resolutions for Speech-Language Pathology programs, emphasizing themes such as curriculum innovation, integration of outreach activities, undergraduate-postgraduate articulation, and strengthening of teaching competencies, in line with the principles of interprofessional education and active learning methodologies[27,28].

Similarly, the Federal Council of Speech-Language Pathology has issued technical opinions and guidelines concerning the qualification of professional training, the use of digital technologies in

clinical practice, and the importance of pedagogical practices that align with scientific, ethical, and technological advancements[29,30]. The absence of an autonomous body solely dedicated to education in Speech-Language Pathology further underscores the strategic role of these committees in consolidating guidelines, fostering educational research, and strengthening pedagogical experiences like the one described here.

In this context, this experience report seeks to contribute to the systematization and dissemination of innovative teaching practices in Speech-Language Pathology, addressing the growing demand for scientific documentation of initiatives that incorporate active methodologies, educational technologies, interdisciplinarity, and a commitment to social transformation.

This event represented a significant innovation in the field of Speech-Language Pathology, being the first to articulate the themes of youth hearing health and communication with the fields of Design and Technology in a fully remote format. Conducted within a public university, the initiative reaffirms the potential of interdisciplinary and digital approaches in health education, particularly in contemporary educational settings.

Conclusion

In conclusion, this experience report detailed the organization of the *Health, Technology, and Communication Hackathon*, presenting the stages led by the integration of the Design and Speech-Language Pathology fields on the themes of hearing health and communication, with emphasis on the collaborative processes adopted, the challenges faced, and the results achieved in promoting health innovations.

Thus, the event represented a pioneering contribution to the field of Speech-Language Pathology, highlighting the importance of using interactive and interdisciplinary methodologies in health education. Initiatives such as this point to promising paths for strengthening health education with youth, integrating innovation, empathy, and digital inclusion into future projects.

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